

SCREENING-LEVEL HAZARD CHARACTERIZATION

SPONSORED CHEMICAL

Sodium Dimethyldithiocarbamate (SDMC)

CASRN 128-04-1

SUPPORTING CHEMICAL

Sodium Diethyldithiocarbamate

CASRN 148-18-5

Chemical Abstract Service Registry Number (CASRN)	<u>Sponsored Chemical</u> 128-04-1 <u>Supporting Chemical</u> 148-18-5
Chemical Abstract Index Name	<u>Sponsored Chemical</u> Carbamodithioic acid, N,N-dimethyl-, sodium salt (1:1) <u>Supporting Chemical</u> Carbamodithioic acid, diethyl-, sodium salt
Structural Formula	<u>Sponsored Chemical</u> SMILES: <chem>CN(C)C(=S)[S-].[Na+]</chem>
Summary Sodium dimethyldithiocarbamate (SDMC) is a solid with negligible vapor pressure and high water solubility. It has high mobility in soil. Volatilization is low. The rate of hydrolysis is rapid under acidic conditions but slower under neutral or alkaline conditions. The rate of atmospheric photooxidation is rapid; however, this is not likely to be an important environmental fate process since this substance is not likely to exist in the vapor phase in the ambient atmosphere. SDMC is not readily biodegradable and is expected to have low persistence (P1) and low bioaccumulation potential (B1). The acute dermal toxicity of sodium dimethyldithiocarbamate is low in rabbits. . In a 13-week oral gavage repeated-dose toxicity study of sodium dimethyldithiocarbamate in rats, significantly increased mean liver weights were observed in all dose groups. At 100 mg/kg-day sodium dimethyldithiocarbamate, females exhibited decreased erythrocyte counts, increased glucose concentration, and increased alkaline phosphatase activity; males had exocrine pancreatic atrophy with fibrosis; the NOAEL for systemic toxicity is 2 mg/kg-day. In a 90-day dermal repeated-dose toxicity study in rabbits, no adverse systemic effects were observed; the NOAEL for systemic toxicity is 120 mg/kg-bw/day. In this study, dermal irritation was observed at 60 mg/kg-bw/day. No specific reproductive toxicity studies are available for sodium	

dimethyldithiocarbamate; however, no adverse effects on the reproductive organs were noted in the repeated-dose studies with rats and rabbits. In a prenatal oral gavage developmental toxicity study in rabbits, sodium dimethyldithiocarbamate resulted in clinical effects, dam and fetal mortality at 38 mg/kg-day; the NOAEL for maternal/developmental toxicity is 13 mg/kg-day. Sodium dimethyldithiocarbamate is mutagenic in bacteria and does not induce unscheduled DNA synthesis *in vitro*. The supporting chemical, sodium diethyldithiocarbamate, did not induce chromosomal aberrations in mammalian cells *in vitro*. Sodium dimethyldithiocarbamate is irritating to rabbit skin, corrosive in rabbit eyes and is a skin sensitizer. The weight of evidence suggests that sodium dimethyldithiocarbamate is neurotoxic.

For sodium dimethyldithiocarbamate, the acute toxicity to fish ranges from 0.34 - 29 mg/L, acute toxicity to aquatic invertebrates ranges from 0.001 to 0.6 mg/L and the toxicity to aquatic plants 96-h EC₅₀ is 0.32 mg/L for growth rate. The 21-d NOEC for chronic toxicity to aquatic invertebrates is 0.004 mg/L.

No data gaps were identified under the HPV Challenge Program.

The sponsor, Rubber and Plastic Additives Panel of the American Chemistry Council, submitted a Test Plan and Robust Summaries to EPA for sodium dimethyldithiocarbamate (SDMC) [CASRN 128-04-1; CA Index name: carbamodithioic acid, N,N-dimethyl-, sodium salt (1:1)] on December 19, 2003. EPA posted the submission on the ChemRTK HPV Challenge Web site on February 4, 2004 (<http://www.epa.gov/chemrtk/pubs/summaries/sodmdicr/c14930tc.htm>). EPA comments on the original submission were posted to the website on August 18, 2004. Public comments were also received and posted to the website.

Sodium dimethyldithiocarbamate is registered as an antifoulant/slimicide in the Office of Pesticide Programs (SDDC, OPP; <http://www.epa.gov/pesticides/reregistration/status.htm>). A summary of the hazard characterization can be found at www.regulations.gov (EPA-HQ-OPP-2009-0321).

Justification for Supporting Chemical

The sponsor provided data for two supporting substances, sodium diethyldithiocarbamate (CASRN 148-18-5) and sodium monomethyldithiocarbamate (metam sodium) (CASRN 137-42-8).

EPA notes that there is an EPA IRIS assessment on the supporting chemical, sodium diethyldithiocarbamate (CASRN 148-18-5) available at: <http://www.epa.gov/iris/subst/0102.htm>. Data for this supporting chemical are considered appropriate for read-across to the sponsored substance based on structural similarities.

EPA notes that sodium monomethyldithiocarbamate (Metam-sodium; CASRN 137-42-8), which was proposed by the sponsor as a supporting chemical, is not the expected degradate of sodium dimethyldithiocarbamate. Therefore, EPA does not consider CASRN 137-42-8 to be an appropriate supporting chemical for sodium dimethyldithiocarbamate.

1. Chemical Identity

1.1 Identification and Purity

Sodium dimethyldithiocarbamate (SDMC) is a solid with negligible vapor pressure and high water solubility. Commercial preparations of SDMC are typically a 40% w/w yellow aqueous solution.

1.2 Physical-Chemical Properties

The physical-chemical properties of SDMC are summarized in Table 1.

Table 1. Physical-Chemical Properties of Sodium dimethyldithiocarbamate (SDMC)¹	
Property	Value
CASRN	128-04-1
Molecular Weight	143.20
Physical State	Solid ²
Melting Point	110°C (measured)
Boiling Point	>300°C (estimated) ^{3,4}
Vapor Pressure	3.7×10^{-8} mm Hg at 25°C (estimated) ³
Dissociation Constant (pK _a)	Not applicable
Henry's Law Constant	$<1.0 \times 10^{-10}$ atm-m ³ /mole (estimated) ³
Water Solubility	1.0×10^6 mg/L at 25°C (estimated) ³
Log K _{ow}	-2.41 (estimated) ³

¹American Chemistry Council Rubber and Plastic Additives Panel. 2003. Test Plan and Robust Summary for Sodium Dimethyldithiocarbamate (SDMC). Available online at <http://www.epa.gov/chemrtk/pubs/summaries/sodmdicr/c14930tc.htm> as of March 27, 2012.

²Sold commercially as a 40% w/w yellow liquid.

³U.S. EPA. 2012. Estimation Programs Interface Suite™ for Microsoft® Windows, v4.10. U.S. Environmental Protection Agency, Washington, DC, USA. Available online at <http://www.epa.gov/opptintr/exposure/pubs/episuitedi.htm> as of March 27, 2012.

⁴A boiling point of 102°C for a 32% aqueous solution of carbamodithioic acid, N,N-dimethyl-, sodium salt (1:1) was reported; however, this likely represents the boiling point of water and not the test compound.

2. General Information on Exposure

2.1 Production Volume and Use Pattern

Sodium dimethyldithiocarbamate (SDMC) had an aggregated production and/or import volume in the United States between 1 to 10 million pounds during calendar year 2005 as reported in the IUR (U.S. EPA, 2010).

Non-confidential information in the IUR indicated that the industrial processing and uses of the chemical include all other chemical product and preparation manufacturing as “other”; and other basic organic chemical manufacturing as processing aid, not otherwise listed. Non-confidential commercial and consumer uses of this chemical include “other” and Not Readily Obtainable (NRO).

2.2 Environmental Exposure and Fate

Sodium dimethyldithiocarbamate (SDMC) is expected to have high mobility in soil. It achieved 2% of its theoretical biochemical oxygen demand (BOD) using an activated sludge inoculum and the modified MITI (OECD TG 301C) test over 28 days. However, it was reported to hydrolyze to form carbon disulfide and dimethylamine during the test period. Since the product dimethylamine is readily degradable, the MITI test result is questionable. Also, an analog, thiuram (137-26-8), was completely degraded in an OECD TG 301D test (HPVIS). In an anaerobic degradation test, tetramethyl thiuram

disulfide and tetramethyl thiuram monosulfide were reported as major decomposition products, but no rates were provided. Volatilization is expected to be low. The rate of hydrolysis is rapid at acidic pH; however, it is moderate to slow under neutral or alkaline conditions. The rate of atmospheric photooxidation is rapid; however, this is not likely to be an important environmental fate process since this substance is not likely to exist in the vapor phase in the ambient atmosphere. SDMC is expected to have low persistence (P1) and low bioaccumulation potential (B1).

The environmental fate of SDMC is summarized in Table 2.

Table 2. Environmental Fate Characteristics Sodium dimethyldithiocarbamate (SDMC)¹	
Property	Value
CASRN	128-04-1
Photodegradation Half-life	1.8 hours (estimated) ²
Hydrolysis Half-life	18 minutes at pH 5; 25.9 hours at pH 7; 433.3 hours at pH 9
Biodegradation	2% after 28 days (not readily biodegradable) ³
Bioaccumulation Factor	BAF = 1.3 (estimated) ²
Log K _{oc}	1.8 (estimated) ²
Fugacity (Level III Model) ²	
Air (%)	<0.1
Water (%)	36.2
Soil (%)	63.8
Sediment (%)	<0.1
Persistence ⁴	P1 (low)
Bioaccumulation ⁴	B1 (low)

¹American Chemistry Council Rubber and Plastic Additives Panel. 2003. Test Plan and Robust Summary for Sodium Dimethyldithiocarbamate (SDMC). Available online at <http://www.epa.gov/chemrtk/pubs/summaries/sodmdicr/c14930tc.htm> as of March 27, 2012.

²U.S. EPA. 2012. Estimation Programs Interface Suite™ for Microsoft® Windows, v4.10. U.S. Environmental Protection Agency, Washington, DC, USA. Available online at <http://www.epa.gov/opptintr/exposure/pubs/episuitedl.htm> as of March 27, 2012.

³National Institute of Technology and Evaluation. 2002. Biodegradation and Bioaccumulation of the Existing Chemical Substances under the Chemical Substances Control Law. Available online at http://www.safe.nite.go.jp/english/kizon/KIZON_start_hazkizon.html as of March 27, 2012.

⁴Federal Register. 1999. Category for Persistent, Bioaccumulative, and Toxic New Chemical Substances. *Federal Register* 64, Number 213 (November 4, 1999) pp. 60194–60204.

Conclusion: Sodium dimethyldithiocarbamate (SDMC) is a solid with negligible vapor pressure and high water solubility. It has high mobility in soil. Volatilization is low. The rate of hydrolysis is rapid under acidic conditions but slower under neutral or alkaline conditions. The rate of atmospheric photooxidation is rapid; however, this is not likely to be an important environmental fate process since this substance is not likely to exist in the vapor phase in the ambient atmosphere. SDMC is expected to have low persistence (P1) and low bioaccumulation potential (B1).

3. **Human Health Hazard**

A summary of health effects data for SIDS endpoints is provided in Table 3. The table also indicates where data for the supporting chemical is read-across (RA) to the sponsored chemical.

A hazard characterization was prepared for sodium dimethyldithiocarbamate in the Office of Pesticide Programs (OPP). The registration and risk assessment history of this pesticide can be viewed at <http://www.epa.gov/pesticides/reregistration/ddcsalts/> and <http://www.epa.gov/oppsrrd1/REDs/ddcsalts-red-amended.pdf>. The risk assessment documents can be found at www.regulations.gov under docket number EPA-HQ-OPP-2009-0321-0005.

Acute Inhalation Toxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

(1) Sprague-Dawley rats (5/sex/group) were exposed to Vancide 51 (27.6% sodium dimethyldithiocarbamate, 2.4% SMBT aqueous solution) at a concentration of 2.05 mg/L for 4 hours. The equivalent concentration of sodium dimethyldithiocarbamate was 0.566 mg/L. No other information was provided.

LC₅₀ > 0.566 mg/L

(2) The OPP RED (See EPA-HQ-OPP-2009-0321-0005) lists the following information for acute inhalation toxicity:

LD₅₀ > 2.22 mg/L

Acute Dermal Toxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

(1) New Zealand Albino rabbits (5/sex) were administered Vancide 51 (27.6% sodium dimethyldithiocarbamate, 2.4% SMBT aqueous solution) via the dermal route at 2000 mg/kg for 24 hours. The equivalent dose of sodium dimethyldithiocarbamate was 552 mg/kg. No animals died during the study. No other information was provided.

LD₅₀ > 552 mg/kg

(2) The OPP RED (See EPA-HQ-OPP-2009-0321-0005) lists the following information for acute dermal toxicity:

LD₅₀ (males) = 1450 mg/kg

LD₅₀ (females) = 1020 mg/kg

Repeated-Dose Toxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

(1) In a 13-week repeated-dose toxicity study, Sprague-Dawley rats (number not specified) of both sexes were administered Aquatreat SDM (typically 40% sodium dimethyldithiocarbamate in water) via gavage at 0, 0.5, 5 or 250 mg/kg-day every day. Equivalent doses of sodium dimethyldithiocarbamate were 0, 0.2, 2 and 100 mg/kg-day. Significantly increased mean liver weights were observed in all dose groups. At 100 mg/kg-day, decreased erythrocyte counts, increased glucose concentration, and increased

alkaline phosphatase activity in females, and exocrine pancreatic atrophy with fibrosis in males were observed. Additional information from OPP RED (See EPA-HQ-OPP-2009-0321-0005).

LOAEL = 100 mg/kg-day (based on clinical chemistry changes in both sexes and effects on pancreas in males)

NOAEL = 2 mg/kg-day

(2) In a 90-day repeated-dose toxicity study, New Zealand White rabbits (number not specified) of both sexes were administered Aquatreat SDM (40% sodium dimethyldithiocarbamate in water) via the dermal route at 0 (control), 50, 150 or 300 mg/kg-bw/day once a day, 5 days/week. Equivalent doses of sodium dimethyldithiocarbamate were 20, 60 or 120 mg/kg-bw/day. White blood cell and platelet counts were reduced at the high dose. Dermal irritation was observed in mid and high-dose animals. Histologic evidence of systemic toxicity was not observed in any animals (evaluated organs not reported). No other information was provided.

LOAEL local ~ 60 mg/kg-bw/day (based on dermal irritation)

NOAEL local ~ 20 mg/kg-bw/day

NOAEL systemic ~ 120 mg/kg-bw/day (based on no adverse effects at the highest dose tested)

Reproductive Toxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

No specific reproductive toxicity study is available. However, no effects on the reproductive organs were identified in the 90-day repeated-dose studies in rats or rabbits.

Developmental Toxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

Prenatal developmental toxicity studies are available for rats and rabbits; however, robust summaries were not prepared. The following information is presented from the OPP RED (See EPA-HQ-OPP-2009-0321-0005):

From a prenatal oral gavage developmental toxicity study with dimethyldithiocarbamate (sodium/potassium not specified) in rabbits, reddish colored material in cage trays, increased mortality of dams and fetuses were observed at 38 mg/kg-day.

LOAEL maternal/developmental toxicity = 38 mg/kg-day (based on clinical signs of toxicity, dam and fetal mortality)

NOAEL maternal/developmental toxicity = 13 mg/kg-day

Genetic Toxicity – Gene Mutations

In vitro

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

Salmonella typhimurium strains TA98, TA100, TA1535, TA1537 and TA1538 were treated with Aquatreat SDM (40% sodium dimethyldithiocarbamate) in the presence and absence of metabolic activation; concentrations were not specified. Strains TA100, TA1535 and TA1537 gave positive results

in the presence and absence of metabolic activation. Cytotoxicity was observed at 6667 mg/plate with metabolic activation and at 667 mg/plate without metabolic activation.

Sodium dimethyldithiocarbamate was mutagenic in this assay.

Sodium diethyldithiocarbamate (CASRN 148-18-5, supporting chemical)

(1) In a reverse-mutation assay *Salmonella typhimurium* strains TA98, TA100, TA1535 and TA1537 were treated with up to 10 mg/plate sodium diethyldithiocarbamate (vehicle: DMSO) in the presence and absence of metabolic activation. The solvent and positive controls behaved as expected. No cytotoxicity was observed. No positive responses were observed. See National Toxicology Program (NTP) data at: <http://tools.niehs.nih.gov/cebs3/ntpViews/?studyNumber=965008>

Sodium diethyldithiocarbamate was not mutagenic in this assay.

(2) In a mammalian cell mutagenicity assay, mouse lymphoma L5178Y cells were treated with up to 10 µg/mL sodium diethyldithiocarbamate (vehicle: DMSO) and placed into suspension cultures. The cells were plated, grown and the colonies counted. No cytotoxicity was observed. Solvent and positive controls behaved as expected. Positive responses were observed. See NTP data at:

<http://tools.niehs.nih.gov/cebs3/ntpViews/?studyNumber=456551>

Sodium diethyldithiocarbamate was mutagenic in this assay.

Genetic Toxicity – Chromosomal Aberrations

In vitro

Sodium diethyldithiocarbamate (CASRN 148-18-5, supporting chemical)

In a mammalian cell cytogenetic assay, Chinese hamster ovary (CHO) cells were treated with up to 152 µg/mL sodium diethyldithiocarbamate (vehicle: DMSO) in the presence of metabolic activation and 1µg/mL in the absence of metabolic activation. The solvent and positive controls behaved as expected. No cytotoxicity was observed. No positive responses were observed. See National Toxicology Program (NTP) data at: http://tools.niehs.nih.gov/cebs3/ntpViews/?studyNumber=552900_CA

Sodium diethyldithiocarbamate did not induce chromosomal aberrations in this assay.

Genetic Toxicity – Other

In vitro

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

In an unscheduled DNA synthesis (UDS) assay, Sprague-Dawley rat liver cells were treated with Aquatreat SDM (40% sodium dimethyldithiocarbamate) at concentrations of 0, 0.5, 1.0, 2.0, 3.0, 4.0, 5.0 or 6.0 µg/mL. A positive control, negative control and solvent control were run concurrently, but the outcome of their testing was not reported.

Sodium dimethyldithiocarbamate did not induce unscheduled DNA synthesis.

Additional Information

Skin Irritation

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

(1) Vancide 51 (27.6% sodium dimethyldithiocarbamate, 2.4% SMBT aqueous solution) and Aquatreat SDM (39.7% sodium dimethyldithiocarbamate aqueous solution) were tested for skin irritation. A volume of 0.5 mL of test material was applied to the shaved skin of six male and female New Zealand Albino rabbits for 4 hours. The test substances were only slightly irritating, with mean primary irritation indices ranging from 1.0 to 1.67.

Sodium dimethyldithiocarbamate was slightly irritating to the skin in this test.

(2) The OPP RED (See EPA-HQ-OPP-2009-0321-0005) states that sodium dimethyldithiocarbamate is mildly to slightly irritating to skin.

Sodium dimethyldithiocarbamate was mildly to slightly irritating to the skin in this test.

Eye Irritation

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

(1) Vancide 51 (27.6% sodium dimethyldithiocarbamate, 2.4% SMBT aqueous solution) (0.1 mL) was instilled into the eyes of nine male and female New Zealand Albino rabbits. After 30 seconds, the eyes of three animals were washed with physiological saline. Irritation and corneal involvement were noted for up to 7 days. Washing reduced the duration of the irritation. The test substance was slightly irritating.

Sodium dimethyldithiocarbamate was slightly irritating to the eyes in this test.

(2) The OPP RED (See EPA-HQ-OPP-2009-0321-0005) states that sodium dimethyldithiocarbamate is corrosive to the eye.

Sodium dimethyldithiocarbamate was corrosive to the eye in this test.

Dermal Sensitization

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

The OPP RED (See EPA-HQ-OPP-2009-0321-0005) states that sodium dimethyldithiocarbamate is a dermal sensitizer.

Sodium dimethyldithiocarbamate is a skin sensitizer.

Neurotoxicity

Sodium dimethyldithiocarbamate (CASRN 128-04-1)

The following information is summarized from the OPP RED (See EPA-HQ-OPP-2009-0321-0005).

(1) In an acute neurotoxicity study (species not stated) with dimethyldithiocarbamate (sodium/potassium not specified), clinical signs of toxicity, numerous functional observational battery parameter effects and decreased motor activity were observed at 790 mg/kg-day.

LOAEL acute neurotoxicity = 790 mg/kg-day (based on numerous functional observational battery parameter effects and decreased motor activity))

NOAEL acute neurotoxicity = 20 mg/kg-day

(2) In a sub-chronic neurotoxicity study (species not stated) with dimethyldithiocarbamate (sodium/potassium not specified), salivation, oral staining and decreased body weight were observed at 98.75 mg/kg-day.

Conclusion: The acute dermal toxicity of sodium dimethyldithiocarbamate is low in rabbits. In a 13-week oral gavage repeated-dose toxicity study of sodium dimethyldithiocarbamate in rats, significantly increased mean liver weights were observed in all dose groups. At 100 mg/kg-day sodium dimethyldithiocarbamate, females exhibited decreased erythrocyte counts, increased glucose concentration, and increased alkaline phosphatase activity; males had exocrine pancreatic atrophy with fibrosis; the NOAEL for systemic toxicity is 2 mg/kg-day. In a 90-day dermal repeated-dose toxicity study in rabbits, no adverse systemic effects were observed; the NOAEL for systemic toxicity is 120 mg/kg-bw/day. In this study, dermal irritation was observed at 60 mg/kg-bw/day. No specific reproductive toxicity studies are available for sodium dimethyldithiocarbamate; however, no adverse effects on the reproductive organs were noted in the repeated-dose studies with rats and rabbits. In a prenatal oral gavage developmental toxicity study in rabbits, sodium dimethyldithiocarbamate resulted in clinical effects, dam and fetal mortality at 38 mg/kg-day; the NOAEL for maternal/developmental toxicity is 13 mg/kg-day. Sodium dimethyldithiocarbamate is mutagenic in bacteria and does not induce unscheduled DNA synthesis *in vitro*. The supporting chemical, sodium diethyldithiocarbamate, did not induce chromosomal aberrations in mammalian cells *in vitro*. Sodium dimethyldithiocarbamate is irritating to rabbit skin, corrosive in rabbit eyes and is a skin sensitizer. The weight of evidence suggests that sodium dimethyldithiocarbamate is neurotoxic.

Table 3. Summary Table of the Screening Information Data Set under the U.S. HPV Challenge Program – Human Health Data		
Endpoint	SPONSORED CHEMICAL Sodium dimethyldithiocarbamate (128-04-1)	SUPPORTING CHEMICAL Sodium diethyldithiocarbamate (148-42-8)
Acute Inhalation Toxicity LC₅₀ (mg/L)	>2.22	–
Acute Dermal Toxicity LD₅₀ (mg/kg)	1450 (male) 1020 (female)	–
Repeated-Dose Toxicity NOAEL/LOAEL Oral (mg/kg-day)	NOAEL = 2 LOAEL = 100	–
Repeated-Dose Toxicity NOAEL/LOAEL Dermal (mg/kg-bw/day)	NOAEL = 120 (highest dose tested)	–
Reproductive Toxicity - NOAEL/LOAEL Reproductive Toxicity	No effects on reproductive organs in 90-d repeated-dose studies in rats (oral) and rabbits (dermal)	–
Developmental Toxicity NOAEL/LOAEL Oral (mg/kg-day) Maternal/Developmental Toxicity	(rabbit) NOAEL = 13 LOAEL = 38	–

Table 3. Summary Table of the Screening Information Data Set under the U.S. HPV Challenge Program – Human Health Data		
Endpoint	SPONSORED CHEMICAL Sodium dimethyldithiocarbamate (128-04-1)	SUPPORTING CHEMICAL Sodium diethyldithiocarbamate (148-42-8)
Genetic Toxicity – Gene Mutations <i>In vitro</i>	Positive	Negative (bacteria) Positive (mammalian cells)
Genetic Toxicity – Chromosomal Aberrations <i>In vitro</i>	No Data Negative (RA)	Negative
Genetic Toxicity – Other <i>In vitro</i>		–
UDS	Negative	
Additional Information Skin Irritation Eye Irritation Skin Sensitization Neurotoxicity	Slightly Irritating Corrosive Positive Positive	–

Measured data in BOLD; – indicates endpoint not addressed for this chemical; (RA) = read across

4. Hazard to the Environment

A summary of aquatic toxicity data submitted for SIDS endpoints is provided in Table 4.

Acute Toxicity to Fish

(1) Sheepshead minnows (*Cyprinodon variegatus*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (48.27% w/v) (concentrations not specified) under flow-through conditions for 96 hours. The NOEC value was 23.9 mg/L and the 96-hour LC₅₀ was reported as 60.1 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 11.5 mg/L (NOEC) and 29.0 mg/L (96-h LC₅₀).

96-h LC₅₀ ~ 29 mg/L

(2) Rainbow trout (*Oncorhynchus mykiss*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (48.27% w/v) (concentrations not specified) under flow-through conditions for 96 hours. The NOEC value was < 3.66 mg/L and the 96-hour LC₅₀ was reported as 6.69 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately <1.77 mg/L (NOEC) and 3.23 mg/L (96-h LC₅₀).

96-h LC₅₀ ~ 3.23 mg/L

(3) Rainbow trout (*O. mykiss*) were exposed to Aquatreat SDM (40% sodium dimethyldithiocarbamate) (concentrations not specified) under static conditions for 96 hours. The NOEC value was 0.3 mg/L and the 96-hour LC₅₀ was reported as 0.85 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 0.12 mg/L (NOEC) and 0.34 mg/L (96-h LC₅₀).

96-h LC₅₀ ~ 0.34 mg/L

(4) Bluegill sunfish (*Lepomis macrochirus*) were exposed to Aquatreat SDM (40% sodium dimethyldithiocarbamate) (concentrations not specified) under static conditions for 96 hours. The NOEC value was <0.6 mg/L and the 96-hour LC₅₀ was reported as 3.3 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately < 0.24 mg/L (NOEC) and 1.32 mg/L (96-h LC₅₀).
96-h LC₅₀ ~ 1.32 mg/L

(5) Bluegill sunfish (*L. macrochirus*) were exposed to Aquatreat SDM (40.47% sodium dimethyldithiocarbamate w/w) (concentrations not specified) under flow-through conditions for 96 hours. The NOEC value was 6.40 mg/L and the 96-hour LC₅₀ was reported as 38.5 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 2.59 mg/L (NOEC) and 15.6 mg/L (96-h LC₅₀).
96-h LC₅₀ ~ 15.6 mg/L

Acute Toxicity to Aquatic Invertebrates¹

(1) Water fleas (*Daphnia magna*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (40.47% w/w) (concentrations not specified) for 48 hours. Conditions were reported as flow-through in one robust summary and static in another. In all three, the NOEC value was 0.0104 mg/L and the 48-hour EC₅₀ was reported as 0.0715 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 0.0042 mg/L (NOEC) and 0.029 mg/L (48-h EC₅₀).
48-h EC₅₀ ~ 0.029 mg/L

(2) Water fleas (*D. magna*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (40% w/w) (concentrations not specified) under static conditions for 48 hours. The NOEC value was < 0.18 mg/L and the 48-hour LC₅₀ was reported as 1.5 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately < 0.072 mg/L (NOEC) and 0.6 mg/L (48-h LC₅₀).
48-h LC₅₀ ~ 0.6 mg/L

(3) Mysid shrimp (*Mysidopsis bahia*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (40% w/w) (concentrations not specified) under static conditions for 96 hours. The NOEC value was 0.00064 mg/L and the 48-hour LC₅₀ was reported as 0.0027 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 0.000256 mg/L (NOEC) and 0.0011 mg/L (48-h LC₅₀).
96-h LC₅₀ ~ 0.0011 mg/L

Toxicity to Aquatic Plants

Green algae (*Chorella pyrenoidosa*) were exposed to a test mixture containing sodium dimethyldithiocarbamate in an aqueous solution (40% w/w) (concentrations not specified) under static conditions for 96 hours in an algal growth inhibition test. The 96-hour EC₅₀ was reported as 0.8 mg/L. The equivalent concentrations of sodium dimethyldithiocarbamate (96-hour EC₅₀ for growth rate) was approximately 0.32 mg/L.
96-h EC₅₀ (growth rate) ~ 0.32 mg/L

¹ Three robust summaries were submitted with virtually identical data.

Chronic Toxicity to Aquatic Invertebrates

Water fleas (*D. magna*) were exposed to sodium dimethyldithiocarbamate at nominal concentrations of 0, 0.009, 0.021, 0.048, 0.080 and 0.19 mg/L under flow-through conditions for 21 days. Analytical monitoring was conducted but the results were not reported. Survival and length were reduced at ≥ 0.021 mg/L and higher. The NOEC value was reported as 0.0104 mg/L and the 48-hour EC₅₀ was reported as 0.0715 mg/L. Equivalent concentrations of sodium dimethyldithiocarbamate were approximately 0.0042 mg/L (NOEC) and 0.029 mg/L (48-h EC₅₀).

48-h EC₅₀ ~ 0.0295 mg/L

NOEC ~ 0.0042 mg/L.

Conclusion: For sodium dimethyldithiocarbamate, the acute toxicity to fish ranges from 0.34 - 29 mg/L, acute toxicity to aquatic invertebrates ranges from 0.001 to 0.6 mg/L and the toxicity to aquatic plants 96-h EC₅₀ is 0.32 mg/L for growth rate. The 21-d NOEC for chronic toxicity to aquatic invertebrates is 0.004 mg/L.

Table 4. Summary of the Screening Information Data Set as Submitted under the U.S. HPV Challenge Program - Aquatic Toxicity Data	
Endpoint	Sodium dimethyldithiocarbamate (128-04-1)
Fish 96-h LC₅₀ (mg/L)	0.34 - 29
Aquatic Invertebrates 48-h EC₅₀ (mg/L)	0.001 - 0.6
Aquatic Plants 96-h EC₅₀ (mg/L) growth rate	0.32
Chronic Aquatic Invertebrates (21-d) (mg/L) 48-h EC₅₀ NOEC	0.03 0.004

Bold = experimental data (i.e. derived from testing)

5. References

U.S. Environmental Protection Agency (2010) Non-confidential 2006 IUR Records by Chemical, including Manufacturing, Processing and Use Information for CASRN 128-04-1. Inventory Update Reporting (IUR); Version 6: Updated May 12, 2010. Available online at <http://www.epa.gov/cdr/tools/previouslycollected.html>